Wildland Fire History

Where do we start discussing wildland fire history—with the beginning of the Earth, with the first hominoid use of fire, which may have occurred well over a million years ago, or with the evolution of prescribed fire beginning in the 1930s in the United States? Or do we define prescribed fire in terms of the Australian Aborigine ancient "firestick" land management practices where fires were started continuously to cleanse the land.

Where we start to tell the story is appropriately defined by those who are listening to our story. The stories of wildland fire, while often having great entertainment value, are told primarily to convey critical resource issue messages.

Fortunately our literature has a wealth of wildland fire knowledge catalogued in books such as Stephen J. Pyne's *World Fire: The Culture of Fire on Earth* (1995) and other *Cycle of Fire* books written by Pyne for the Weyerhaeuser Environmental Books Series (William Cronon, ed.).

The story of the history of fire is fascinating. It is a story of how fire has shaped the landscape, our human history, our cultural evolution, and the natural and built communities in which we reside. It is a story of building up and burning down, of shaping and reshaping. While natural wildland fire has exerted its own shaping forces, humans using both native wisdom and scientific knowledge of fire ecology and fire management have also shaped fire regimes.

As we tell the story of fire to illustrate the science of wildland fire management, we also need to tell stories that promote coexistence with wildland fire. We are reminded each year as the fire season manifests itself that fire has been with us since the beginning of time and will probably be with us throughout time.

North America has a rich wildland fire history illustrating human coexistence with fire, the impacts of fire suppression, and the ravages of wildland fire. The Forest History Society (www.lib.duke.edu/forest/), among others, catalogs such conservation history.

North American wildland fire history is usually interpreted as events, mostly conflagrations. However, wildland fire should be interpreted as an ongoing organic event. The process is often only interpreted based on recent events. Although human settlement of North America is relatively young, the history of wildland fire is not. Fossilized fusian, or fire scars in fossilized trees, as well as other mineralized materials, help tell more ancient stories.

The earliest European settlers to North America noted indigenous peoples' use of fire for clearing land, hunting and gathering activities, and in warfare. The American Bison (buffalo) arrived on the eastern shores of what is now the United States about the time of the arrival of the Mayflower. This migration of bison has been attributed in some part to the opening of grazing areas by Native American practices of burning the land.

Native American oral history is rich with stories about fire and how fire came to humans; their drawings depict the use of fire. William Bartrum, noted naturalist, during his travels in Florida in the 1700s, reported fires burning somewhere every day. While Native Americans had fire firmly rooted in their way of life, post-Columbian immigrants in the new world sought a new order which did not embrace fire as a natural process. Suppression became the call.

Agricultural crops and communities of wooden homes were not adapted to the natural cycle of fire. While many Native American groups were relatively nomadic, the new settlers were not. To the new immigrants, flaming fire meant the loss of everything, while Native Americans simply relocated their communities in concert with this natural force.

The new culture in North America, while seeking to control fire, did use fire for land clearing,

cleaning areas of snakes, brush, and briars, and to enhance wildlife propagation. However, the practices were ill-conceived by today's standards and often resulted in conflagrations, not enhancements.

By the advent of the American Revolutionary War fire regimes had begun to change. European perspectives of fire were crossing the Allegheny Mountains. Within 100 years they would reach to the west coast. By the post-Civil War period the last of interior Florida wildland was being settled, the last open ranges in the Dakotas hosted extensive herds of cattle, and the last great virgin forests were beginning to fall. With the spread of human activities, the booming American population began to spread fire.

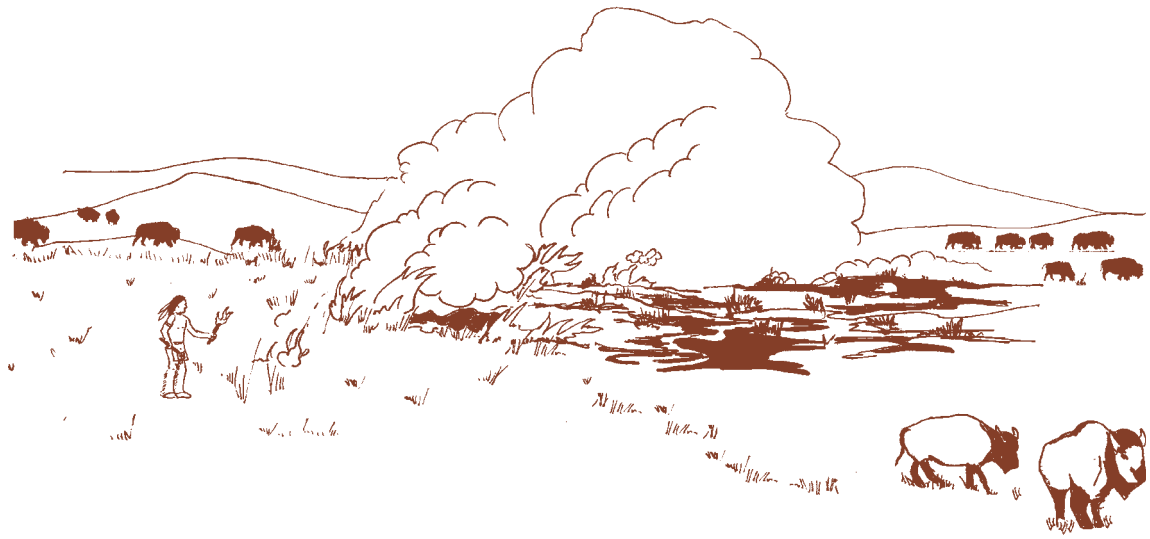
Often careless or ignorant use of fire resulted in conflagrations. The Peshtigo, Wisconsin, fire of 1871 left 1,300 dead and over one million acres charred. Newspaper headlines and government debates flourished. So did wildland fires—many became data points for disaster (e.g., Yacult, Washington burn in 1902; Virginia's Dismal Swamp burn in the 1930s; Oregon's Tillamook burns in the 1930s and 40s).

So great were the fires of 1880 that Pyne in *America's Fires: Management on Wildlands and Forests* (1997) called the period "The Great Barbecue." Essentially North America was on fire, not under a natural regime, but as a result of human ignition sources and shifting land practices.

The creation of the U.S. Forest Service formalized a national approach to wildland protection, which was heavily weighted toward suppression. As other federal and state land resource management agencies came into being, they followed the U.S. Forest Service's lead. That lead advocated a national perspective of fire eradication and was underpinned by a lack of understanding of managing in concert with natural forces (e.g., predators, fires, floods). As a nation we sought to have "dominion over" the forces of nature.

While the battle was valiant, the battle plan was flawed. Numerous firefighting organizations sprung up at the local levels; fire tool cache boxes were scattered throughout the country; and a national agenda was put into place. The battles were fought from every sector—governments organized, varied firefighting hardware was invented or redesigned, and religious leaders in the southeastern United States, where fire was indiscriminately used more so than in other places, preached of the "evils" of setting fires. While not completely suppressed, there was a great reduction in wildland fire.

The United States moved within less than 100



years from a nation of conflagration to a fire-starved nation. Not only had the great fires been doused but so had the ideas of natural fire, those low burning fires that cleaned excess forest litter and kept prairies open.

As early as the 1930s, land managers in the southeastern United States began arguing for the return of more natural fire regimes. Other fire-dependent regimes were equally in need of fire, but had few advocates. While few could argue, then or now, that the suppression and prevention of extreme fire was not appropriate, few were arguing that the focus should be on maintenance of natural fire regimes.

The Yellowstone fires of 1988 and more recently the benchmark fire season of 2000 have begun to shift public perspective and have opened a revised chapter in wildland fire history. Perhaps we as a society are on the threshold of returning to a state where we understand that ecosystem health and sustainability are based in great part on natural fire regimes. The key question is: Are we ready to return to wisdom held in traditional hunter and gatherer societies that fire is as natural as water; both can be givers and takers of life and property?

Our historical epilogue though can never embrace this ideal state beyond the idea. Not only do we no longer hunt and gather but our landscape is interspersed with fixed human settlements and is dependent upon stability that can no longer accommodate natural fire under a total natural regime.

Even our wildlands are now being transformed to accommodate human settlement. It is the "I-Zone," the wildland/urban interface, that redirects the story we are to tell. As the nearly half million acre fires in Florida (1998) showed, firefighters' primary focus was on the saving of individual homes and communities scattered amongst the shrub and timbered lands, not managing the total fire.

Adding to the complexity of fire management and contemporary history is the issue of smoke management. How does smoke impact human health, transportation, agriculture, atmospheric carbon loading, and global warming? The regulatory community now struggles with atmospheric impacts, weighting them against the danger of reducing prescribed fire.

Our habitations force the decisions out of the biogeophysical fire realm into one of protecting that which we materially value. Thus the history we are living and the history we write will continue to be one of dominion of nature. The history will probably be one of a more passive dominion by seeking to emulate natural processes, such as prescribed fire and other physical processes that control fuel loading.

Our history may be channeled along fairly fixed storylines in that true natural fire regimes can only exist in relatively vast wildlands, mostly in the west. Even prescribed fire management stories are restricted in that human settlement patterns make prescribed fire difficult to use. Prescribed fire could be a much more useful tool were homes clustered leaving substantial tracts of wildlands between communities. Also, as humans spread over the landscape, issues of wildland/urban interface become exacerbated in numerous resource managers issues, including wildland fire (e.g., smoke impact and regulation, legal authority and legal responsibility for prescribed fire and impacts). (For further discussion see Ewert, Chavez, and Magill [1993].)

Pyne, in *World Fire* (1995), shares an idea key to framing wildland fire messages that draws upon history when he writes:

"By studying fire-events, practices, regimes and images—one can extract information from the historic record that might otherwise be inaccessible or overlooked. Just as burning often flushes infertile biotas with nutrients and as cooking renders palatable many otherwise inedible food stuffs, so fire can remake new raw materials into humanly usable history. Around the informing fire, humans tell the stories that make up their history that says who we are."

Wildland fire history is critical to telling the story of our ecological history. Without this historical perspective we are without a baseline perspective to make our story whole. Without a whole story for society to understand, those who seek to manage wildland fire with a Pulaski in one hand, a set of regulations in the other, and a news microphone in front of them, will continue to find the message wanting.

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The I-Zone: A Human Dimension of Wildland Fire

Fire knows no human boundaries. It does not recognize wealth or poverty, property lines, or political lines. It does not distinguish between abandoned structures or places we consider valuable. It does not stop to consider the economic, social, or aesthetic value of something. It will burn whatever is in its path, as it has always done, and always will. Fire is nondiscriminatory, and thus, it can affect any and all of us.

Since World War II, wildland fire has become more relevant to all of us. After the war, dual trends emerged which have led to complex situations. People began to move out of urban areas and into suburban and semirural areas. Simultaneously, the country's population continued to grow rapidly, and more people began to set aside additional time for outdoor leisure activities. As a result, settlements in and the use of wildlands increased. Occupants often chose the area for its pristine environment, or for recreational purposes. The cost of living can be significantly lower than in urban areas, and thus can attract all economic classes. These factors have led to a unique problem, an area known as the wildland-urban interface, or I-Zone. A substantial human presence coexists uneasily with areas of fire-prone forest, brush, and grassland vegetation.

The interface is actually made up of three types of configurations. The "classic" interface is a result of urban sprawl. Homes and structures are placed in direct contact with wildland, and the inhabitants often have come directly from urban areas. The "intermix" interface occurs when single or clustered homes and other structures are scattered throughout a wildland area, e.g., summer homes, suburban homes on large tracts of land, and isolated recreation areas, such as cabins, mobile homes, and camping facilities. Many individual structures are often surrounded by woodland vegetation, and are served only by narrow roads, making it very difficult to reach these areas if fires occur. The "occluded" interface consists of islands of wildland within an urban area, such as a city park, or land considered unsuitable (e.g., too steep) for a structure. The threat of fire in these areas is low, but when fires break out here, there can be a substantial risk to surrounding structures and to those who use the natural areas.

Though the I-Zone problem is a national one, California was probably the first state to experience the phenomenon, and has endured several devastating fires. One extreme example occurred in October 1991, when wildland fire broke out in an urban Oakland park. It spread throughout an intermix area, and ignited much of the adjacent urban area. Twenty-five people were trapped and killed, and more than 3,000 homes were destroyed. Before that, in 1985, major wildland fires destroyed more than 1,400 homes and killed 44 people across the country, especially in the Southeast, New England, Idaho, Nevada, and central California.

Wildland-urban interface fires tend to be more damaging than urban structural fires, are often more difficult to control, and behave differently than structural fires. Interface areas are also likely to be increasingly flammable because of intensive suppression of fire cycles. Fires ignite indirectly in structures, and directly from accidental causes related to recreational and commercial use of the wildland. When these fires erupt, people and structures must take priority, often at a devastating expense to natural resources. People who live in these areas often come directly from urban areas, and may bring with them careless habits, and little understanding about wildland fire cycles and dangers. Homes and other structures are built and maintained in a manner which leaves them and their occupants vulnerable. Thus, fire becomes a significant threat to

both humans and natural resources.

Another factor that contributes to the destructiveness of wildland fire is that structural firefighters are trained and equipped differently than wildland firefighters. Urban firefighters rely on the water systems provided in urban settings, and count on catching the fire in its early stages. Often, neither of these situations exists in the I-Zone. Wildland firefighters have no ready water supply except what they transport to the site. They also anticipate larger fires, and are thus trained to fight the fire from its perimeter, clearing fuel to prevent spread. Complications arise at interface fire.

There is considerable debate about who should take responsibility for this unique problem, and what can be done about it. Some believe that homeowners should take the most responsibility. In other words, some argue the risk-takers should pay for their decision to live in a potentially dangerous interface area, by paying more taxes and by taking precautions around their property. Realtors also have the responsibility to disclose the fire hazard possibilities. Designers and developers also need to take more responsibility. However, critics argue that making the necessary economic investments would be impossible for some residents, and others are unwilling to modify their home and surroundings for fear of compromising the rustic look.

Others assert that the whole community should take responsibility for the hazards. Property owners should be encouraged to make their own land fire resistant and defensible, and community governments should create, promote, and enforce fire-safety laws and adequate zoning codes. Community planners also need to understand and foresee how population growth, use patterns, and changing demographics will influence and contribute to the interface problem. Insurance companies should provide incentives and disincentives that encourage homeowners to take risk-reducing measures. Fire protection agencies should be more aggressive in effectively communicating the problem, consequences, and solutions of interface fires. However, critics fear that the community approach ignores the natural environment and its protection, and only concentrates on people and structures. There is also skepticism about getting all of the involved parties to work together.

Land management agencies have also been called upon to take a more active role in helping to control the problem by reducing fuel around interface areas regularly, so that fires are easier to manage and control. They may also rely on a prescribed fire regimen, but these carry some elements of risk. The concepts of “not in my backyard” and smoke impacts restrict options. In reality, residents must understand that fire and resulting smoke will occur on the site; the question is will it occur under a controlled, prescribed burn or as a conflagration. However, a regimen that involves both land management agencies and private landowners cooperating to maintain reduced fuel around structures could be much less destructive, more cost-efficient than suppressing fires, and much safer.

Though a comprehensive solution to the wildland-urban interface problem may not be immediately forthcoming, there are several simple and

relatively inexpensive precautions the private homeowner can take to reduce the risk. The following are excellent talking/teaching points for the communicator.

Roofing

Homeowners should use alternatives such as asphalt, fiberglass, concrete tile, clay tile, or metal instead of wood shingles or shakes. Rain gutters should be cleaned regularly, as dead needles and leaves can be very flammable. Tree limbs should be cut back and cleaned away from the house, and the chimneys should be cleaned at least once a year.

Vegetation

To reduce fuels that could lead fire to the house, all dead lower branches should be cleared. Trees should be clustered so that there are gaps in the canopy (more difficult for fire to spread), and disturbed land grasses (those tall grasses introduced) should be cut within 30 feet of the house. Fire-resistant shrubs and vegetation should be planted, and combustible debris should be removed from under porches, decks, and crawl spaces.

Exterior Walls

Alternatives to wood siding, such as brick, stone, or metal are encouraged. These materials improve resistance to fire. If a homeowner already has wood siding, the amount of defensible space (space between the house and vegetation) should be increased to compensate. All crawl spaces and open areas under decks should be screened off.

Remote Location

If a home is located in a remote location, quick and open lane access for large fire apparatus should be provided for firefighters, and the address should be clearly posted so firefighters can find the house easily.

Slope

The steeper the slope, the more preparation is required. Wildfires readily burn up slopes and gullies as in "chimneys." The amount of defensible space should be increased as the steepness of the slope increases. Clearance alone is not enough, because wind can bring the fire to the house. The fuels should be reduced, but some plants should remain for slope stability. Also, a deck or wall built on the edge of the slope can deflect heat from the house.

Lack of Water

An independent water supply should be made available. Homeowners who install a cistern for water storage increase their chances of reducing fire damage.

Wildland fires always have and probably always will occur in most ecosystems. As people expand into these wildlands, the interface zone grows and so does the threat wildland fires pose to people and the threat people and their fires pose to wildlands.

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Author: Colleen Labbe

http://www.firewise.org

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The
FIREWISE HOME PAGE
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Effects of Wildland Fire on Cultural Resources

Wildland fire on our public lands can be a double-edged sword with respect to the historic cultural resources we try to protect. Recent fires in Mesa Verde National Park have illustrated the complicated role that raging fires can play. In 1996, a 1,000-year-old petroglyph was irreparably damaged by the heat of wildfire. The apparently indelible images in the sandstone can be exfoliated away under sustained intense heat. However, just four years later, another massive wildland fire revealed more than a dozen previously undiscovered sites as it stripped the blanket of vegetation that had concealed them for hundreds of years. As we move into a new era of ecosystem management, we are increasingly appreciating the role humans play in those ecosystems. Correspondingly, we are working to protect the physical manifestations of that role, both past and present, which are embedded in the landscape we manage.

People and their cultures are a natural part of our ecosystems. We have a rich history of interaction with the land and each other. The evidence of our cultures, past and present, can be found throughout our forests, prairies, and deserts. Whether a stone tool from a native prehistoric community or a long-abandoned cabin from an early European or African American settler, over time cultural artifacts become incorporated into the landscape. Therefore, when managing the land it is impossible to ignore the cultural resources contained therein.

Fire, too, is a natural part of Earth's ecosystems. Almost every landscape has a history of fire activity, some more active than others. An ecosystem's fire history is contained within its landscape—in tree scars, soil layers, or charcoal seams within the ground. Some fires occurred prehistorically as the result of lightning strikes, but even ancient cultures manipulated the plant and animal life around them through the use of fire. Managing the land, its cultural resources, and the behavior of fire within the natural systems become inseparable as we strive to protect both our natural and cultural heritage.

Research conducted in southern California indicated that U.S. Forest Service employees have had very limited contact with cultural resources and their management; however, they have favorable opinions regarding cultural resources (Conner et al. in Ewert et al., 1993). As we move into a more cooperative era of fire, land, and cultural resource management, we can build on these positive opinions. By communicating both strategies for protection, as well as an understanding of their historical importance, cultural resources may be better protected during all phases of management, including fire. But who needs to know this information? Managers and planners certainly can benefit from an understanding of protection strategies for archeological sites or other cultural resources under their jurisdiction, but additional attention must be paid to the information needs of frontline firefighters, the public, educators, and the media. With ecosystem management increasingly accounting for the human dimensions in all aspects of land management, community support for (and understanding of) management practices is even more important (Eisenhauer, 2000).

Protected Cultural Resources

The diverse cultural resources of any area can include artifacts, structures, and traditionally significant gathering places from both prehistoric and historic eras. Memorials built to commemorate historic events, the crumbling foundations of pioneer homes, and tools from the earliest occupants of an area are all examples of significant cultural resources that help us decipher the human history of a landscape. Sites considered sacred or used for ceremonial purposes by people of today are also significant cultural resources. Areas in which medicinal plants are collected, clays are dug, mounds

and other earthworks are found, and traditional gathering places are valued by various groups of people as a link to their cultural history. The contribution of such sites to the recreational economy of some areas is significant as well. Often the direct costs of damage to sites of historical and cultural interest are difficult to assess. Damage to re-created villages, scenic overlooks, and historic battlegrounds can severely impact an area that depends on tourism to sustain its economy.

In addition to their value for popular and historical interest, natural and cultural resources are valued and prioritized by federal policy to be protected during wildland fire management (U.S. Depts. of the Interior and Agriculture, 1995). Cultural resources on federally managed lands are protected by law (for a list of related federal laws, see Pyne, *Introduction to Wildfire*, 1996, p. 337). Often the resources to be protected are well-known, traditional sites whose preservation is part of an official mandate by a management agency. However, we can only guess at the number of cultural resources that remain undiscovered or at least unrecorded. Understanding the potential impact of wildland fire on cultural resources is imperative to a comprehensive management plan.

Damage to Cultural Resources

The damage to cultural resources during a wildland fire can occur both from the fire itself and from the actions of those fighting or managing the fire. During the early years of firefighting on public lands, fighters, unaware of laws banning the removal of artifacts, 'looted' archeologically significant sites during the suppression activities. Much has been done to prevent such misunderstandings from reoccurring; but less obvious effects of fire and firefighting remain to be fully understood.

Effects of fire itself vary tremendously depending on the intensity of the fire, its duration, and the depth of the heat's penetration into the soil. A fire's intensity, the measure of the severity of a fire, is often expressed for archeological purposes as either low, moderate, or heavy (Lentz et al., 1996). Some ecosystems' fire regimes indicate much hotter fires (standing grass on a prairie, for instance). Others, like those whose winds blow up steep hills, allow more quickly moving fires. Knowing the fire regime of the ecosystem you are managing—the vegetation, climate, and terrain—is key to understanding the behavior of fire. Add to this an understanding of the fire suppression activities in the area, including physical impacts from both fire and the firefighters, and a clearer picture develops of the potential for damage to cultural resources from wildland fire.

Fires in any system will burn longer and hotter if there is an abundant accumulation of dry fuel, or duff, on the ground. When fire has been prevented over a long period of time, often the duff layer is too thick for any hope of a cool, low-impact burn. The below-ground heating will depend on factors such as soil moisture, soil type and coarseness, weather conditions, the accumulation of duff, organic litter, or fuel above ground. Understanding the local fire regime and pairing that knowledge with an understanding of the types of cultural resources your site may contain is the first step in ensuring that your fire management practices help to preserve all aspects of the site. This type of informed planning often requires communication across local agencies and among various divisions within those agencies—the park historian or archeologist should be able to lend his or her expertise to the land management department and vice versa.

Many times protection efforts are confounded by the mixed goal of trying to preserve cultural resources no longer within their original cultural fire context. The area that no longer has the same

cultural fire practices that shaped the early environment can be vastly different from the historical landscape. A ceremonial area, significant in part due to its proximity to ritually used plants, may have existed only as a result of early burning by Native Americans. In this case, burning can actually serve to preserve a cultural resource.

Firefighting can cause severe damage, not only to the artifacts on a site, but to the context of those artifacts as well. From an archeological standpoint, removing or damaging an artifact's setting in space, its context, can be even more detrimental than the damage from the fire itself. Why? Because artifacts lose their meaning when removed from the clues that place them within a historical context. A projectile point is interesting, but that same stone point found near the bones of a deer indicates much more about the cultural and natural setting of the artifact. Therefore, it is important that those on the front lines of fire suppression and prescriptive burning understand the consequences of using heavy equipment such as bulldozers to construct firelines. Attention must be paid also to post-fire mop-up and rehabilitation, and the potential corrosive properties of retardants. Simply knowing where culturally sensitive areas lie within our wildlands and which practices can damage those areas will help to minimize damage on the part of firefighters.

A primary factor in potential damage to a cultural resource is its location. In some instances, artifacts are strewn about on the ground. Many are buried below the surface, and some are large, above ground constructions or buildings. Artifacts on the surface are most vulnerable and those progressively deeper below ground are less prone to damage. Much as the underground seeds, roots, rhizomes, and bulbs of many plants are protected during a fire, so too can archeological remains survive a cool burning surface fire. Temperatures over 300°C can be damaging to many inorganic materials—ceramics, having already been through a firing process, are not critically effected until temperatures reach 600°C. (More information on temperature thresholds of specific materials can be found in the National Wildfire Coordinating Group's *Fire Effects Guide*, 1994.) In addition to causing deterioration of the materials such as cracking, chipping, and charring, heat can obliterate objects created from wood or plant material. Other culturally significant information in the form of pollen grains used to assess diet and environmental conditions of the past can be destroyed, and dating techniques can be rendered inaccurate when heat damages some artifacts.

What to Consider

Ultimately, all of these factors bring us to the need for planning. No plan is foolproof against fires which are born of a combination of extreme weather, multiple ignition points, and exceptional fire behavior. We must remember that fire is not simply a tool for the management of resources, but an active part of the systems we want to protect. Managers must work with fire in mind and anticipate the needs of the areas they maintain. Key to an effective land/fire/cultural resource management plan is the proactive definition of protection priorities. When, as standards have dictated in the past, private or public property is the focus of protection, some cultural and natural resources may be neglected. However, the value of both natural and cultural resources can be a complicated calculation, with many considerations. Managers must be allowed the flexibility to balance the protection of low-value real estate and highly valued natural and cultural resources when necessary. These decisions can be controversial and are best made before a crisis emerges.

Prescribed burning, in which fires typically remain below 500°C and have a residence time of half an hour or less, is likely to do very little damage

to archeological artifacts and resources at even shallow depths (Pyne, 1996). Important above ground structures must be protected from fire and may require alternatives to burning in surrounding areas. Coordinating knowledge of prescribed burning techniques, fire suppression practices, and archeological research can produce a proactive approach to natural and cultural resource protection.

Planning for Protection

Prior to any tactical decisions, managers will want to assess the conditions for burning within the specific ecosystem context in order to determine if a cool burn is possible. Just as this inventory of ecological conditions is important, so too is a cataloging of the resources for protection within a management area. The technology of geographic information systems can greatly contribute to mapping the natural and cultural resources of an area, and there is potential for using geographical positioning systems in the field to assist firefighters in avoiding culturally sensitive areas. A thorough understanding of the laws surrounding burning and resource protection should be gained as well. Alternatives to the traditional approaches to burning may be considered. Manual fuel reduction may be needed in cases of extreme fuel load or near buildings in burn areas. The use of foams during suppression may also be a viable alternative to more damaging retardants. The professional removal of valuable artifacts prior to an intentional burn may be warranted when the conditions indicate a heavy fire intensity is likely. Lastly, it is equally important to perform post-burn inventories of cultural resources.

The impacts of fire on cultural resources are not fully understood, and it is often difficult to determine if an artifact was significantly more affected by current fire practices than by the fires of the historical regime. We do know that fire does not enhance the condition of archeological material, and heavy fuel load, even on a localized scale, is a primary factor in increasing the amount of damage to artifacts. Our ability to protect cultural resources during fire events is greatly dependent upon knowing where culturally valuable sites are located.

In order for a fire crew to adequately protect these areas from fire and firefighting, they must understand fully the location and relative sensitivity of the resources. Internal communications and the proactive planning described above are central to effectively protecting our cultural resources. Archeologists can benefit from an understanding of firefighting, and frontline fire crews should be educated about cultural resource protection. Without such communication among disciplines and agencies, our cultural heritage will continue to fall victim to wildland fires and, in some cases, prescribed fire.

The recent fire in Mesa Verde National Park is an example of the coordination needed in firefighting in order to minimize the damage to artifacts by modern fires. Burning through an area of great archeological significance, the Bircher fire was fought on the frontline by both firefighters and archeologists. As the flames continued to spread uncontained, both groups toiled alongside each other in a joint effort to save the natural and cultural resources of the past and the future. The fire crews hiked into the canyons and mesas, aided by archeologists who pointed out ancient ruins that needed special protection. As the fire continued to expose new sites in its deforested wake, archeologists helped firefighters identify these sites and marked them with color–coded flags. Where possible, frontline fire crews were able to construct the fire line around the marked sites and protect them (CNN, 2000). It is this kind of interdisciplinary teamwork that has been born out of a new understanding and appreciation for the significance and delicacy of our nation's cultural resources.

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